

Abstract Submitted to the
International Conference on Strongly Correlated Electron Systems
University of Michigan, Ann Arbor
August 6-10, 2001

Disorder Effects on Ferromagnetism in $\text{Ga}_{1-x}\text{Mn}_x\text{As}$

Mona Berciu, R. N. Bhatt
Princeton University, Princeton, USA

Using a numerical mean field treatment, we have examined the onset of ferromagnetism and the nature of the ferromagnetic phase in $\text{Ga}_{1-x}\text{Mn}_x\text{As}$ for charge carrier densities in the vicinity of the metal-insulator transition. Our approach explicitly takes into account the positional disorder of the Mn ions within a tight-binding model of the Mn impurity band. We find that the ferromagnetic transition temperature is significantly enhanced as a result of disorder. Both the magnetization as well as specific heat in the ferromagnetic phase exhibit a very unusual temperature dependence. We describe the spectrum of the low-energy spin-wave excitations and how it is influenced by disorder. We also analyze the nature of the ferromagnetic metal-insulator transition, and the unusual spin and charge transport characteristics. Finally, the effect of compensation and other interactions will be discussed.